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Vesicular Exanthema Eradication Program

(A Report of Progress)

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Significant progress has been made in controlling the swine disease, vesicular exanthema. Only 15 new outbreaks in 2 States have been reported during the first 9 months of 1955. Federal quarantines are in effect in only 6 States, effecting parts of 35 counties. Principal means of spread is by infected raw pork scraps in garbage fed to swine. Emphasis in the eradication program is placed on encouraging swine producers to cook garbage used as feed.

If present cooperation of swine raisers, industry, State and Federal officials is continued and expanded, animal disease authorities believe the disease can be completely eradicated.

Vesicular exanthema has appeared in 42 States and the District of Columbia since 1952. It is of major economic importance to swine producers and a potent threat to the entire livestock industry because it could mask an outbreak of the much more serious foot-and-mouth disease. Symptoms of the two diseases are identical, while foot-and-mouth disease affects all ruminants as well as swine.

Information in this report was provided by the Animal Disease Eradication Branch and the Animal Disease and Parasite Research Branch, Agricultural

Research Service

VESICULAR EXANTHEMA ERADICATION PROGRAM

Outbreaks of vesicular exanthema, a virus infection of swine which swept across the country during the last 3 years, have been sharply reduced. Incidence dropped from a high of 777 new cases of infection reported between November 1952 and April 1953 to 15 new cases during the first 9 months of 1955. Fourteen of these cases were in California and one case, in February, appeared in South Carolina.

Symptoms of this swine disease are almost identical to those of the much more virulent and contagious foot-and-mouth disease, which affects other cloven-hoofed animals as well as swine. Laboratory tests and the inoculation of test animals are the sole methods of distinguishing between the two diseases when only swine are infected. Vesicular exanthema does not affect man. However, eradication is vitally important because this disease presents a double threat. Not only is it a financial burden to the swine producer, but it could permit the entrance and spread of foot-and-mouth disease to be overlooked or mistaken for VE.

Spread of VE may be accomplished in several ways, the most common of which are through contact with infected and exposed animals or contaminated facilities, or through intake of live virus in infected pork scraps found in raw garbage. Animal disease eradication officials have attacked VE through the means by which it spreads:

- (1) Prompt disposal of infected and exposed swine is required.
- (2) Movement of raw-garbage-fed swine is controlled to prevent possible infectious contact with healthy swine.
- (3) Special processing of pork and the cooking of garbage to kill virus in carrier pork cuttings are required to keep the virus from being fed to healthy, garbage-fed hogs.

At the present time less than 0.4 of one percent of hogs produced in this country are fed raw garbage--yet this small percentage constitutes a threat to the entire industry.

Inspection of garbage feeding premises is an important weapon in combating this threat. Regular inspection, on a semimonthly basis, provides the means of detecting the disease as soon as it appears and of advising owners on proper methods of cooking. Quarantines are used to control movement of infected or exposed swine when they are discovered.

HISTORY OF THE OUTBREAK

Vesicular exanthema has existed and at times has been widespread in California for at least 20 years, but the disease was not identified outside that State until it was discovered at Grand Island, Nebr. The suspicious animals were reported to the former Bureau of Animal Industry on June 16, 1952.

Tests completed before July 1 eliminated the possibility of foot-and-mouth disease. The source of infection was traced to a shipment of hogs received from Cheyenne, Wyo. The normal movement of hogs to market introduced the infection to major public stockyards, then to packing establishments, and finally back to farms. Within 45 days, VE had appeared in 18 States.

Federal quarantines were established on a county basis and were supported by local quarantines applied by State authorities. A state of emergency was proclaimed in August 1952 by the Secretary of Agriculture and emergency funds were made available to wage an active campaign. Indemnities were paid for animals condemned under the eradication program, and cleaning and disinfection measures were initiated to control the disease.

Yet VE spread. By early 1953 it had appeared in 40 States and the District of Columbia. Both State and Federal regulatory officials recognized that the disease could not be stopped without control of the movement of raw-garbage-fed swine, and without a garbage cooking program. By the latter part of April 1953, 17 States had active laws or regulations requiring the cooking of garbage. Virtually no garbage fed to swine was cooked before that time. Two months later, in June 1953, 35 States had adopted garbage cooking regulations. As of September 1953, 46 States required the cooking of garbage to be fed to swine.

The 2 States that do not require garbage to be cooked at the present time are New Jersey and Connecticut.

As of September 30, 1955, about 218,000 hogs in 31 States were being fed raw garbage -- down almost 50 percent from a year ago. Ninety percent of these swine are produced in only 5 States. The decline in the number of raw-garbage-fed hogs reflects the increased adherence to the garbage cooking program.

MOVEMENT OF GARBAGE-FED SWINE REGULATED

Federal regulations, designed to support State vesicular exanthema eradication programs, were drawn up at the same time individual States were passing garbage cooking laws. These regulations established that swine that had ever been fed raw garbage could not be shipped interstate except for special processing, which reduces the market value of

animals up to 50 percent. At first, however, facilities for cooking garbage were not widely manufactured and practically unobtainable, and personnel was not available to advise hog raisers and to inspect cooking facilities. As a result, this regulation was relaxed somewhat. Swine producers were allowed to market interstate without processing precautions if hogs had not been fed raw garbage for the preceding 30 days -- enough time for symptoms to appear if the swine had contracted VE from previously fed raw garbage.

Equipment and inspection personnel are now available. In view of the reduced incidence of the disease and the smaller number of swine affected, the Animal Disease Eradication Branch has announced that the original regulation enacted for VE control will become fully effective on January 1, 1956.

On and after that date, owners who are still feeding raw garbage to swine will be confronted with three alternatives:

- (1) Begin cooking garbage.
- (2) Conform to restricted marketing, in some instances, within their State.
- (3) Conform to restricted marketing interstate for processing only.

These last two choices are often impractical. Marketing of raw-garbage-fed swine within the State usually is prohibited by State law and marketing interstate for special processing sometimes reduces the sale value of swine by 50 percent. The first alternative, however, has more to offer economically.

If garbage is properly cooked and fed to swine for 30 days, producers may market without further restriction until January 1. After that date, only hogs started on and fed cooked garbage throughout their lives are free from the special restrictions.

INDIVIDUAL STATE STANDINGS

Slightly more than half of the hogs being fed raw garbage in the United States, or about 121,000 head, are produced in New Jersey, where on September 30 of this year garbage was being cooked on only 46 of the 436 garbage-feeding premises. Eighty percent of all premises that feed garbage to swine are inspected semimonthly for VE infection, and to determine that proper cooking methods are followed on those premises feeding cooked garbage.

Texas ranks second among the States in which hogs are fed raw garbage with 45,000 head. In this State garbage is cooked on 124 of 1,036 premises on which garbage is fed. The State has no inspection.

The biggest recent step in VE eradication was taken in California where feeders and the swine industry are supporting a cooked garbage program. State legislation was passed May 25, 1955, which requires the cooking of garbage on or after January 1, 1956. Most garbage feeders in the State have already adapted their operations to the cooking program.

VESICULAR EXANTHEMA RESEARCH AND CONTROL

Control Measures

In addition to garbage cooking, quarantine, and special processing, several other methods are being applied to control and eliminate VE in this country.

Cleaning and disinfection of exposed premises, trucks, and cars is an important part of the program. Movement of garbage-fed hogs is checked, and inspection of stockyards is still necessary to prevent infected swine from recontaminating major shipping and processing centers.

Since the biologics used to prevent the spread of hog cholera are made from swine blood, they might be a means of spreading VE unless proper precautions are taken. Therefore, the manufacture of these biologics includes pasteurization at 59°C. for 30 minutes under conditions approved by the U.S. Department of Agriculture. This treatment will kill any VE virus that might be present in the material.

The swine industry is kept informed of the progress and objectives of the eradication programs through an advisory committee, composed of 15 representatives of the industry selected by the Secretary of Agriculture. These representatives also serve in an advisory capacity to the Department in formulation of VE control policy.

Research as the Basis

Effective control measures are based on research. A thorough knowledge of a disease and its characteristics, its causative agent and methods of transmission, points the way to eradication. The vesicular exanthema program is no exception.

When VE first spread across the country, veterinarians of the Animal Disease Eradication Branch, charged with controlling the disease, needed to know the answers to many questions. Studies were started by scientists of the Animal Disease and Parasite Research Branch to determine the facts that form the basis of current eradication procedures. The work is still continuing. About 2,500 swine have been used in the experiments so far.

One of the first questions that needed a quick answer: How was VE spreading? Earlier California research was confirmed concerning the methods of spread. VE is spread by direct or indirect contact and by infected raw pork scraps being fed in garbage.

Research workers infected test swine and moved them from pen to pen, exposing susceptible, isolated swine in periodic succession. The disease proved to be contagious on contact. The healthy swine contracted VE. But more important, experimentation along these lines showed the disease to be contagious before any outward symptoms of the disease appeared. A hog can spread the disease for 12 hours or more before there is visible evidence that the hog is sick.

Research workers next experimented to determine how long the flesh of an infected hog could reproduce VE when fed to susceptible swine. An entire herd of swine was given the disease at the same time. Then the hogs were slaughtered at intervals in groups of 2, and the meat from these slaughtered swine was fed to susceptible swine.

This work revealed that when an infected hog was slaughtered a full day before vesicles would have normally appeared, the raw pork from the animal was capable of reproducing VE if fed to another hog. The disease could be transmitted before the hog showed evidence of sickness. Also, the meat of the test hogs, slaughtered after lesions developed, reproduced the disease when fed to susceptible swine.

Further research on the incubation stage of VE revealed that the time between initial exposure and the beginning of the contagious stage varied. The quantity and strength of the virus and the method of exposure proved directly related to length of incubation period.

The fact that VE was in the contagious stage, either through contact or through raw pork, for up to a full day before clinical symptoms appeared, indicated to veterinarians that the disease could not be controlled through inspection and quarantine alone.

The next step was to discover if VE could be stopped at the packing plant. Research workers planned experiments to reveal how long the virus remained infective in blood and tissue after the diseased swine were slaughtered.

The answer had to be determined through actual experiments, because the sensitivity of virus to environment varies between one disease and another. Virus of foot-and-mouth disease, in some instances, is killed in meat stored at normal refrigeration temperatures due to an increase in meat acidity. However, in stored pork the change in acidity is not great enough to destroy the infectivity of the VE virus. Scraps of stored VE-infected pork reproduced the disease up to the time the meat started to decay. Frozen meat remained infective as long as research workers cared to store it. The packing plant could help control vesicular exanthema only through special processing.

But first, research workers had to establish what would kill the VE virus. They had to determine just what type of special processing of pork was necessary. Their most practical answer was heat.

Regulatory officials applied this research in formulating the garbage cooking program. It was established that maintaining garbage at 212° F. for 30 minutes kills the virus. This procedure is required as part of official eradication measures.

Instances have been reported in which swine infected with the virus have shown no external signs of sickness. Though no evidence was visible, these swine were capable of reproducing the disease in other swine on contact or through raw scraps of their carcass in garbage. Research workers called this characteristic of vesicular exanthema "inapparent infection" or "smouldering VE." Discovery of "inapparent infection" and its continued incidence is one of the major reasons why it is considered necessary to prohibit the interstate shipments of swine that have ever been fed raw garbage.

More Problems to be Solved

Throughout the study of vesicular exanthema, only swine were used in the experiments. No laboratory animal has proved susceptible. The expense and difficulty in obtaining large numbers of swine for experimental animals are limiting factors in continuing research. Tissue culture, still in the experimental stage, may be the answer to this problem. The use of tissue culture will eliminate many of the difficulties encountered when experimentation is confined to swine alone.

Research is still working on another problem: A good, faster test is needed to differentiate VE from foot-and-mouth disease and vesicular stomatitis. An accurate test is also needed for identifying the five or more types of VE virus.

NATIONAL SITUATION AS OF SEPTEMBER 30, 1955

On September 30, 1955, cooked garbage was being fed on 83.3 percent of the garbage feeding premises in the United States. These premises accounted for 85 percent of the garbage-fed swine. Semimonthly inspections were being made on 90 to 100 percent of the garbage feeding premises in 35 States.

Since the outbreak of VE began in 1952, Federal quarantines have been in effect at some time in 42 States. At the end of September 1955, quarantines were in effect in only 6 States. These States and the 35 affected counties are as follows:

CALIFORNIA: Parts of Alameda, Los Angeles, Napa, Orange, Sacramento, San Bernardino, Santa Clara, Sonoma, and Tulare counties.

CONNECTICUT: Parts of Hartford and New Haven counties.

MASSACHUSETTS: All of Suffolk County and parts of Bristol, Essex, Hampden, Middlesex, Norfolk, Plymouth, and Worcester counties.

NEW JERSEY: Parts of Union, Middlesex, Cape May, Burlington, Hudson, Atlantic, Morris, Gloucester, Ocean, Camden, Monmouth, and Hunterdon counties.

NEW YORK: Part of Rockland County.

RHODE ISLAND: Parts of Bristol, Providence, and Kent counties.

OUTLOOK

New infection has appeared in only 2 States in the last 9 months, but VE has not been eradicated. The Federal-State cooperative program is being continued to prevent reintroduction of the disease in clean areas and increased efforts are being encouraged to eradicate existing infection.

The goal of the campaign is to wipe out the disease. In reaching that goal, major emphasis is being placed on cooking all garbage fed to swine as the best means of striking at VE. In addition, it is a means of preventing the spread of other animal diseases such as hog cholera, swine erysipelas, and vesicular stomatitis.

